

Appl. No. : **10/623,482**
Filed : **July 18, 2003**

REMARKS

In the Office Action mailed on November 3, 2005, the Examiner rejected all pending claims, Claims 1-22, 38-41, 43-57 and 105-106. Applicants respectfully request full consideration of the remarks contained herein.

Rejections Under 35 U.S.C. § 103(a)

The Examiner has rejected Claims 1-22, 38-57 and 105-106 under 35 U.S.C. § 103(a) as being unpatentable over *Luo et al.* in view of various secondary references. *Luo et al.* is asserted for teaching the general features of independent Claims 1 and 38. The Examiner notes, however, that *Luo et al.* teaches silane and disilane as silicon sources, but does not teach trisilane, as recited in the claims. *Cote et al.* (U.S. Patent No. 6,252,295) is asserted for teaching trisilane as a silicon reactive gas. As a suggestion to combine these references, the Examiner pointed to *Todd et al.* (U.S. Patent Application Publication No. 2003/0082300) as a “teaching reference” and stated that “one of ordinary skill in the art would have found it obvious to substitute trisilane for silane, disilane or any other silicon forming reactive gases[sic] ... greater film uniformity can be obtained by introducing the higher-order silane like trisilane, see *Todd et al.*.” The Examiner has also asserted *Niimi et al.* (U.S. Patent No. 6,503,846) and “admitted prior art” to teach various features of dependent claims.

Applicants respectfully traverse the rejections and submit that the pending claims are patentably distinct.

The art of record does not establish a *prima facie* case of obviousness. Applicants note that the Examiner must provide evidence of a motivation to form the claimed combination in order to establish a *prima facie* case of obviousness. See M.P.E.P. § 2142. Applicants submit that the art of records does not provide evidence establishing a motivation to replace silane or disilane with trisilane and, so, does not establish a *prima facie* case of obviousness.

The only reference relied upon by the Examiner to provide a motivation to combine is *Todd et al.* Applicants note, however, that *Todd et al.* is not available as prior art against the present Application. Based upon the earlier effective U.S. filing date of *Todd et al.* and its publication on May 1, 2003, less than a year before the Application’s filing date of July 18, 2003, *Todd et al.* constitutes prior art under 35.U.S.C. 102(e). However, *Todd et al.* and the

Appl. No. : 10/623,482
Filed : July 18, 2003

Application were, at the time that the invention of the Application was made, owned by, or subject to an obligation of assignment to ASM, America Inc. As such, Todd *et al.* is not available to support a rejection under 35 U.S.C. § 103. See 35 U.S.C. § 103(c) (“Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.”) (emphasis added). Because the sole reference provided by the Examiner to establish the requisite motivation to combine is not available as prior art for obviousness rejections against the Application, Applicants submit that the art of record fails to satisfy all the requirements for establishing a *prima facie* case of obviousness. Thus, Applicants respectfully request that the rejections for obviousness be withdrawn.

Applicants emphasize that the art of record does not contain any particular motivation to substitute the silane and disilane taught by Luo *et al.* with the trisilane disclosed by Cote *et al.* Luo *et al.* simply teaches processing with silane and disilane, and Cote *et al.* only discloses a list which includes trisilane: “silane, disilane, trisilane, tetrasilane, dichlorosilane, and trichlorosilane.” See Cote *et al.*, Col. 2, lines 53-55. This list merely acknowledges the existence of trisilane as a silicon precursor. However, evidence that trisilane exists as a potential silicon precursor is not equivalent to evidence teaching a motivation to substitute trisilane for silane or disilane in the process of Luo *et al.*: the “[f]act that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish *prima facie* obviousness.” M.P.E.P. § 2143.01. While teaching that trisilane is a known compound, Applicants submit that the art of record does not provide any particular motivation to use trisilane in place of silane or disilane in the recited process. Thus, Applicants submit that the art of record, including Niimi *et al.* and “admitted prior art,” does not satisfy the deficiencies of Luo *et al.* and Cote *et al.*.

In contrast, Applicants have discovered and disclosed unexpected results: that trisilane can advantageously be utilized in a cyclic process to form silicon-containing compound layers. Trisilane can be used to form exceptionally uniform silicon layers that can subsequently be fully reacted to form films with excellent stoichiometry and superior electrical properties. See, e.g.,

Appl. No. : **10/623,482**
Filed : **July 18, 2003**

the Application, pp. 17-18, 33-34. In comparison, precursors such as silane form less uniform silicon layers. When forming silicon compounds, the parts of the substrate which underlie thinner parts of the silicon layers can be reacted, which can result in the formation of silicon-containing layers, such as silicon nitride layers, that have inferior electrical properties. *See, e.g.*, the Application, pp. 13-14, 34. While the Application discloses an advantageous cyclic process for depositing superior silicon-containing compound layers using trisilane, the art of record neither recognizes the problems associated with silicon precursors such as silane, nor does it recognize the advantageous results of applying trisilane in the claimed process. Moreover, the substitution of trisilane for more conventional precursors, such as silane and disilane is non-trivial, since trisilane has different physical properties and requirements for deposition applications from such conventional precursors. Given the recipe and equipment adjustments associated with such a change of precursor, Applicants submit that the skilled artisan would not substitute silane or disilane with trisilane without first recognizing the particular benefits of trisilane in this context. As noted above, however, it is Applicants, and not the art of record, that has recognized these benefits.

Accordingly, Applicants submit that the pending claims are allowable over the art of record. Applicants have not specifically addressed the further rejections of dependent claims as being moot in view of the amendments and remarks herein. However, Applicants expressly do not acquiesce in the Examiner's findings not addressed herein. Indeed, Applicants submit that the dependent claims recite further novel and non-obvious features of particular utility.

Appl. No. : 10/623,482
Filed : July 18, 2003

CONCLUSIONS

In view of the foregoing amendments and remarks, Applicants request entry of the amendments and submit that the application is in condition for allowance and respectfully request the same. If some issue remains which the Examiner feels may be addressed by Examiner's amendment, the Examiner is cordially invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: January 3, 2008

By: Adeel S. Akhtar
Adeel S. Akhtar
Registration No. 41,394
Attorney of Record
Customer No. 20,995
(415) 954-4114

2238865
122205